Fastener Materials Selection Based on the Galvanic Reaction of Metals

Base Metal \ Fastener Metal	Zinc & Galvanized Steel	Aluminum & Aluminum Alloys	Steel & Cast Iron	Brasses Copper Bronzes & Monel	Martensitic Stainless Type 410	Austenitic Stainless Type 302/304, 303, 305
Zinc & Galvanized Steel	1	2	2	3	3	3
Aluminum & Aluminum Alloys	1	1	2	3	Never Recommended	2
Steel & Cast Iron	1,4	1	1	3	3	2
Teme (lead-tin) Plated Steel Sheets	1,4,5	1,5	1,5	3	3	2
Brasses, Copper Bronzes & Monel	1,4,5	1,5	1,5	1	1	2
Ferritic Stainless Steel (type 430)	1,4,5	1,5	1,5	1	1	1
Austenitic Stainless Steel (type 302/304)	1,4,5	1,5	1,5	1,5	1	1

Key:
1. **The corrosion of the base metal is not increased by the fastener.**
2. **The corrosion of the base metal is marginally increased by the fastener.**
3. **The corrosion of the base metal may be considerably increased by the fastener material.**
4. **The plating on the fastener is rapidly consumed, leaving the bare fastener metal.**
5. **The corrosion of the fastener is increased by the base metal.**

NOTE: Surface treatment and environment can significantly alter activity.

Mechanical Properties of Common Stainless Steel Fasteners in Accordance with ASTM F593

Stainless Alloy Group	Condition	Nominal Diameter (Inches)	Tensile Strength (psi)	Core Hardness Rockwell Min.	Core Hardness Rockwell Max.	Minimum Yield Strength (psi)	Grade Identification Marking
Group 1 303, 304, 304L, 305 384, XM1, XM7, 303Se	CW 1	1/4 - 5/8	100,000 - 150,000	B95	C32	65,000	
	CW 2	3/4 - 1-1/2	85,000 - 140,000	B80	C32	45,000	
Group 2 316, and 316L	CW 1	1/4 - 5/8	100,000 - 150,000	B95	C32	65,000	
	CW 2	3/4 - 1-1/2	85,000 - 140,000	B80	C32	45,000	

CW: Headed and rolled from annealed or solution-annealed stock.

Alloy-Steel and Stainless Steel for use in High Temperature Service

Specification	Material	Nominal Diameter (Inches)	Minimum Tensile Strength (psi)	Rockwell Hardness (Maximum)	Minimum Yield Strength (psi)	Grade Identification Marking
ASTM A193 Grade B7	Chromium-Molybdenum (AISI 4140, 4142, 4145, 4140H, 4142H, 4145H)	Up to 2-1/2 Over 2-1/2 - 4 Over 4 - 7	125,000 115,000 100,000	C35 C33 C29	105,000 95,000 75,000	
ASTM A193 Grade B8 Class 1	AISI 304	1/4 and Larger	75,000	B96	30,000	
ASTM A193 Grade B8M Class 1	AISI 316	1/4 and Larger	75,000	B96	30,000